

BRIDGE SECURITY


ARCHITECTURE & URBAN DESIGN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION



State Bridge and Structures Architect
Paul Kinderman PE AIA






Issue at a glance
an Olympic Region perspective

- Encampment removals occur on average three times annually at each occupied location.
- The average clean-up cost for one removal, including labor, equipment and materials, is \$1,600.
- In 2006, WSDOT maintenance crews in Tacoma spent \$80,000 to repeatedly clean a problematic area (I-5/I-705 interchange), following business complaints, and another \$30,000 on bridge fencing that occupiers damaged, vandalized and stole.
- Olympic Region recently built three new Nalley Valley bridges that present tempting encampment sites.
- Six more tempting bridge sites will be built in the I-5: M Street to Portland Avenue - HOV project.
- The estimated cost of keeping just these nine new locations encampment-free is \$43,000 annually without additional security steps.


Beyond the Call of Duty

Over the last 10 years, Olympic Region maintenance crews have seen an increase in the number of homeless encampments on WSDOT property, particularly along the highway corridors near Tacoma, Puyallup and Olympia. The encampments are located in shrubbery, under bridges and in other areas away from public view. The encampments are often cluttered with drug paraphernalia, stolen items, human waste, rotting garbage and other dangerous or toxic items.

These encampments and their occupants present a significant challenge to WSDOT's maintenance, signal and bridge crews as they try to perform their day-to-day duties. The sites continually expose crews to a population of chronic trespassers. Although sympathetic to the occupants' situations, WSDOT crews are untrained to deal with the issues these occupants present, including potential mental health issues, stolen state property, health hazards and threats.



Areas under bridge girders become attractive homes for encampments.



This camper dug a hole in the fill to access under this bridge deck.

AGENDA

AUDIENCE:
SMART PHONE
WEB SEARCH



TRENDS & HISTORY



ROBERT MOSES

WSDOT POLICIES



CPTED

POLICY IMPLEMENTED

Assessment and Mitigation Measures for
Graffiti on Highway Structures

RONALD W. ECK AND DAVID R. MARTINELLI

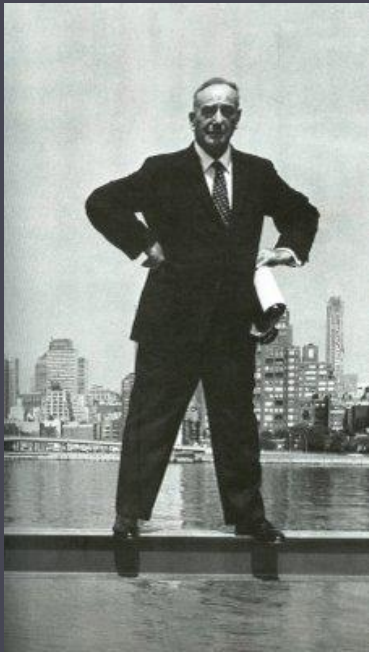
WSDOT
SEW ABUTMENT
CONFIGURATION

HISTORY

Context Sensitive Design



□ Context Sensitive Design



Robert Moses
1881-1981



Jane Jacobs
1916-2006

HISTORY

Jane Jacobs



□ Context Sensitive Design



Jane Jacobs & Robert Moses



Richard Florida: Economist



Randy Atlas: Architect & Criminologist

WSDOT POLICIES



- CSS
- CPTED
- WSDOT *Bridge Design Manual*
- WSDOT *Design Manual 950 Public Art*

Context Sensitive Design

FHWA CSS National Dialog 2



Examples

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miltonj@wsdot.wa.gov

Suburban Arterial SR 99 in the City of SeaTac



The City of SeaTac is often considered to be WSDOT's first attempt to use the philosophy of context sensitive design. While the project was considered a success for its final aesthetic appeal it became a learning opportunity for both WSDOT and its city counterpart. The issue of clear zone and sight distance was a primary discussion issue on this project because of the 45 mph speed limit.

SeaTac challenged the notion that designs could in fact allow for a tree environment and still be considered reasonably safe. The issue of trade-offs became paramount to the discussion. It was argued that trees allowed for a design which would reduce access points and angle accidents, and provide benefit to the pedestrian. In addition, the proposed design was intended to provide aesthetic, environmental, and economic benefit to the city.



Early results indicate that trees placed in very narrow medians (6' or less) were struck at unacceptable rates. This led to new landscaping design for these medians in phases 3 and 4 of the corridor project. These designs have been met with praise for vegetation use and reduction of objects in the clear zone. Interestingly, crime rates through the area have dropped.

Suburban Arterial SR 99 in the City of Des Moines

The project goals were improving traffic congestion, operations, and safety; providing facilities for transit and pedestrians; and encouraging economic redevelopment along the SR 99 corridor through the city of Des Moines. The existing roadway was an undivided five-lane facility with a two-way left-turn lane (TWLTL) and paved shoulders with minimal access control.

The project required extensive effort from all parties to achieve a successful final product. A number of public meetings were held to ensure the project would meet the defined objectives and yet be completed on time and within budget.

A High Occupancy Vehicle and Business Access lane was added in each direction of the route. Also included were bus pullouts and new transit shelters. Pedestrian features included sidewalks on both sides of the highway, new street and sidewalk lighting, mid-block pedestrian uplighting, and a pedestrian-activated signal. One of the specific features that was included in this project is a landscaped median that eliminates the existing two-way left-turn lane. The median is installed to improve both pedestrian and vehicular safety. A low profile concrete barrier protects the tree median. Gateway treatments were constructed at either end of the project.



Context Sensitive Solutions

Understanding Flexibility in Highway Design

January 2005



The Philosophy of Context Sensitive Practices

Whatever name is chosen to define context sensitive design (CSD), the vision remains the same. CSD provides a project that meets the purpose and need as defined by all project partners. It allows for the development of a project that remains a safe and efficient facility for its users and community. The project adds to the livability of the community because it preserves environmental, scenic, aesthetic, historic, and natural resource values of the area. The WSDOT Context Sensitive Solutions Executive Order E-1028-00, can be found at: <http://www.wsdot.wa.gov/dca/OperatingRules/Procedures/1028.pdf>.

To accomplish a vision of context sensitive design requires an understanding of community values and the tools to help achieve those values by project managers, highway engineers, architects, environmental managers, public involvement personnel, and senior and executive level managers and administrators.

WSDOT tools have been developed to foster this understanding among the different level of designers and decision makers. This document discusses these tools and provides examples for different contexts and road environments.

WSDOT is exploring sub-classifications of the functional class system which will allow designers to consider the context in which the road is being developed in addition to the functional class. Accordingly, WSDOT developed a urban design manual supplement for its managed access facilities to allow for more flexibility in design as an everyday part of doing business.

"I am impressed by the time, dedication and concern of the Washington State Department of Transportation, which has been sensitive to the historical and aesthetic concerns of those of us who often travel that road and love the beauty of the area. I think this concern for safety, while acknowledging the importance of history and aesthetic, is impressive and I am grateful the 'easy solution' was not considered 'good enough'."

Excerpt from a letter of a historian, author and member of the Daughters of the Pioneers of Washington on Deception Pass Design Efforts.



- FHWA
- WSDOT Executive Order



Current FHWA outreach

CPTED Crime Prevention Through Environmental Design



Through Environmental Design

CPTED Security Training
Consultants: Henry Erickson and John Houch

Campus and School Security Assessments and Training

Public Art and Crime Prevention
"From Bright to Bright"

Legal Updates
[California Lemon Law](#)

CPTED Compliance
Consultant Services

Home About Experience Contact

We at CPTED Security Consultants have decades of experience in and community oriented public safety. We have extensive governmental and private sectors in developing solutions to crime network of professionals, who are called upon to form a specialized project is unique and may require very specialized experts. CPTED solutions and in putting together the best team to approach the individual project. We do not approach crime prevention and security. We analyze each project and determine the needs of the client and prevention program specifically for that project.

LAW ENFORCEMENT PROJECT EXPERIENCE

Long Beach Police Department - Long Beach California

CPTED Expert for City. Worked in Crime Prevention, Investigations for past 7 years: existing residential, commercial and government properties for past 7 years crime and bright at "hot-spot" properties. Inspected proposed new developer services. Conducted research on CPTED applications and theories. Write CP

CPTED Principle #1 Natural Surveillance

"See and be seen" is the overall goal when it comes to CPTED and natural surveillance. A person is less likely to commit a crime if they think someone will see them do it. Lighting and landscape play an important role in Crime Prevention Through Environmental Design.



CPTED Principle #2 Natural Access Control

Natural Access Control is more than a high block wall topped with barbed wire. Crime Prevention Through Environmental Design or CPTED utilizes the use of walkways, fences, lighting, signage and landscape to clearly guide people and vehicles to and from the proper entrances. The goal with this CPTED principle is not necessarily to keep intruders out, but to direct the flow of people while decreasing the opportunity for crime.



CPTED Principle #3 Territorial Reinforcement

Creating or extending a "sphere of influence" by utilizing physical designs such as pavement treatments, landscaping and signage that enable users of an area to develop a sense of proprietorship over it is the goal of this CPTED principle. Public areas are clearly distinguished from private ones. Potential trespassers perceive this control and are thereby discouraged.



CPTED Principle #4 Maintenance

CPTED and the "Broken Window Theory" suggests that one "broken window" or nuisance, if allowed to exist, will lead to others and ultimately to the decline of an entire neighborhood. Neglected and poorly maintained properties are breeding grounds for criminal activity. We will work with you to develop a formal CPTED based maintenance plan to help you preserve your property



Crime prevention through environmental design

From Wikipedia, the free encyclopedia



This article has been nominated to be checked for its neutrality. Discussion of this nomination can be found on the talk page. (January 2013)

Crime prevention through environmental design (CPTED) is a multi-disciplinary approach to deterring criminal behavior through environmental design. CPTED strategies rely upon the ability to influence offender decisions that precede criminal acts. Generally speaking, most implementations of CPTED occur solely within the urbanized, built environment. Specifically altering the physical design of the communities in which humans reside and congregate in order to deter criminal activity is the main goal of CPTED. CPTED principles of design affect elements of the built environment ranging from the small-scale (such as the strategic use of shrubbery and other vegetation) to the overarching, including building form of an entire urban neighbourhood and the amount of opportunity for "eyes on the street".

Criminology and penology



Theory [edit]
Types of crime [edit]
Penology [edit]

V-T-E

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1 History



CPTED

WSDOT

Paul Kinderman PE AIA

Matt Rochon PE Associate AIA

- WSDOT Design Manual
- WSDOT Design Build RFP
- DB Architectural Guidelines

WSDOT Bridge Design Manual



- ❑ New Chapter 2.8 Bridge Security
- ❑ New Bridge Site Data form
- ❑ New Design Build Manual

New Field

Washington State Department of Transportation		Bridge Site Data General	
Region	Made By	Date	
Bridge Information			
SR	Bridge Name	Control Section	Project No.
Highway Section	Section, Township & Range	Datum	
Structure width between curbs?		What are expected foundation conditions?	
Will the structure be widened in a contract subsequent to this contract? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		When can foundation drilling be accomplished?	
Which side and amount?		Is slope protection or riprap required for the bridge end slopes? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Will the roadway under the structure be widened in the future? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		Are sidewalks to be provided? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Stage construction requirements? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		If Yes, which side and width?	
Should the additional clearance for off-track railroad maintenance equipment be provided? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		Will sidewalks carry bicycle traffic? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Can a pier be placed in the median? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		Will signs or illumination be attached to the structure? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
What are the required falsework or construction opening dimensions?		Will utility conduits be incorporated in the bridge? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Are there detour or shoofly bridge requirements? (If Yes, attach drawings) <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		What do the bridge barriers transition to?	
Can the ROW be adjusted to accommodate toe of approach fills? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		Furnish type and location of existing features within the limits of this project, such as retaining walls, sign support structures, utilities, buildings, powerlines, etc.	
What is the required vertical clearance?		Are there bridge security issues, such as the presence of illegal campers, that require design considerations?	
What is the available depth for superstructure?		Any other data relative to selection of type, including your recommendations?	
Are overlays planned for a contract subsequent to this contract? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
Can profile be revised to provide greater or less clearance? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
If Yes, which line and how much?			
Will bridge be constructed before, with or after approach fill? <input type="checkbox"/> Before <input type="checkbox"/> With <input type="checkbox"/> After <input type="checkbox"/> N/A			
Attachments			
<input type="checkbox"/> Vicinity Map			
<input type="checkbox"/> Bridge Site Contour Map			
<input type="checkbox"/> Specific Roadway sections at bridge site and approved roadway sections			
<input type="checkbox"/> Vertical Profile Data			
<input type="checkbox"/> Horizontal Curve Data			
<input type="checkbox"/> Super-elevation Transition Diagrams			
<input type="checkbox"/> Tabulated field surveyed and measured stations, offsets, and elevations of existing roadways (See Design Manual M-22-61, Chapter 7.10)			
<input type="checkbox"/> Photographs and video of structure site, adjacent existing structures and surrounding terrain			
<input type="checkbox"/>			
<input type="checkbox"/>			

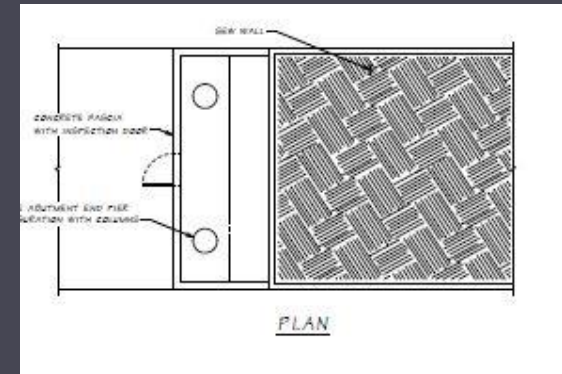
DOT Form 336-8/02 BP
Revised 1/06/13

WSDOT Bridge Design Manual

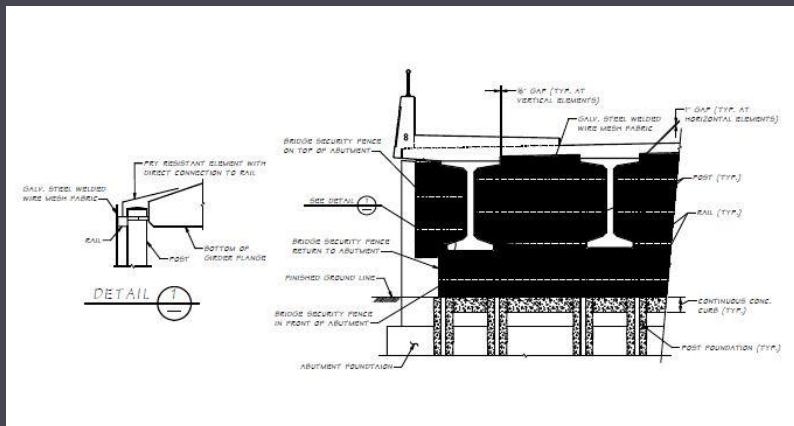


STRATEGIES

- ❑ No Abutment Alcoves
- ❑ No flat spots under bridges
- ❑ Screening as last resort



BDM Figure: Abutment



BDM Figure: Screening

WSDOT *Design Manual*



Chapter 950

Public Art

950.01	General
950.02	References
950.03	Definitions
950.04	Standard Architectural Design
950.05	Criteria for Public Art
950.06	Process and Project Delivery Timing
950.07	Approvals
950.08	Documentation

950.01 General

There has been a growing interest on the part of communities to use art within the transportation facilities of the Washington State Department of Transportation (WSDOT). It can be used to provide visual interest along roadsides, make unique statements about community character, and create positive public response that will last over time.

Proponents for public art might be local agencies or engaged citizens' groups with interest in the outcome of a WSDOT project. The environmental and public involvement processes offer opportunities for community partnership on the visual and aesthetic qualities of a corridor.

The public art policy in this chapter is intended to provide guidance for managing public art on WSDOT projects; reinforce the existing policy in the [Roadside Classification Plan](#); designate appropriate locations for the incorporation of public art features; and provide for the consistent use of statewide development, review, and approval processes on new and existing features. (Note that nothing in this chapter is to be construed to *require* public art on WSDOT projects.)

The appropriateness of public art is frequently dependent upon its location and composition. An art piece or feature chosen for the back side of a noise wall, at a safety rest area, or along a bike path may not be suitable at the end of a freeway ramp or along the main line of a highway. In addition to appropriate placement, WSDOT must balance the requests for proposed public art projects with the need to provide corridor continuity, improve the unity of highway elements, and provide roadsides that do not divert motorists' attention from driving.

While some local jurisdictions dedicate a percentage of their project budgets for art, WSDOT has no such dedicated funding. Section 40 of the State Constitution specifies that gas tax money must be used for a "highway purpose." Therefore, public art beyond WSDOT standard design is typically funded by other sources. The [Roadside Funding Matrix for WSDOT Capital Projects](#) was developed to provide guidance for funding various elements found within public works projects on which WSDOT is the lead agency.

When city or community entrance markers are proposed, this policy should be used in conjunction with the guidance contained in the [Traffic Manual](#).

- ❑ WSDOT Design Manual
- ❑ Chapter 950 Public Art

POLICY IMPLEMENTED



EXAMPLES

- Mt. Vernon Wall
- Ben Franklin Bridge Philadelphia Surveillance
- I 205 Mill Plain Blvd Screening

Mt. Vernon Wall

Territorial Reinforcement



Existing Kincaid Street I 5 ramp wall

Graffiti Site



Initial Public Art Proposal

Local Artist Concept

Benjamin Franklin Bridge: Philadelphia

Hard Armor



Surveillance

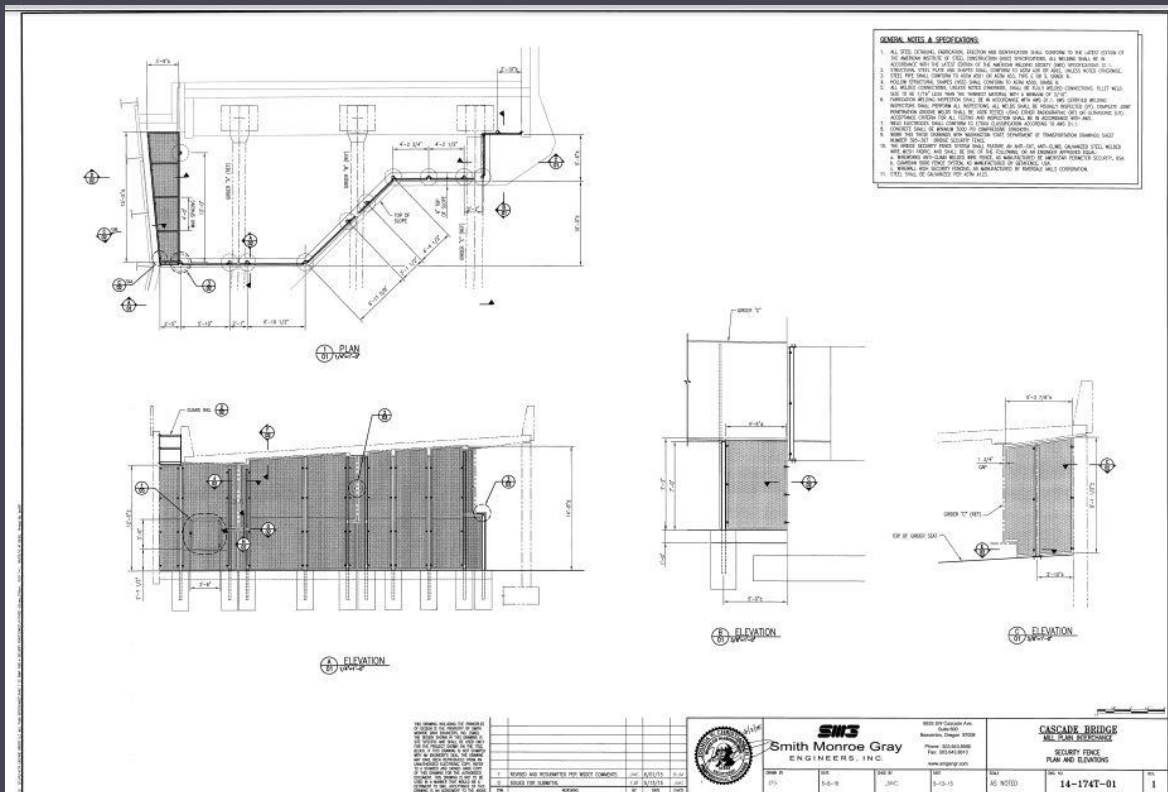


Benjamin Franklin Bridge: Philadelphia



Screening

Mill Plain I5 Screening



Contractor Design

J. Christensen
14-174T

Cascade Bridge LLC
STRUCTURAL CALCULATIONS
FOR
Mill Plain Interchange
Security Fence

09/17/15
REV 2

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DESIGN REFERENCES:

AISC Steel Construction Manual - 14th Edition
ACI 318-11 Building Code Requirements For Structural Concrete

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